Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Growth Mechanism of Microbial Colonies[1] MINHUI ZHU, K. MICHAEL MARTINI, NEIL H. KIM, NICHOLAS SHERER, JIA GLORIA LEE, THOMAS KUHLMAN, NIGEL GOLDENFELD, Univ of Illinois - Urbana — Experiments on nutrient-limited *E. coli* colonies, growing on agar gel from single cells reveal a power-law distribution of sizes, both during the growth process and in the final stage when growth has ceased. We developed a Python simulation to study the growth mechanism of the bacterial population and thus understand the broad details of the experimental findings. The simulation takes into account nutrient uptake, metabolic function, growth and cell division. Bacteria are modeled in two dimensions as hard circle-capped cylinders with steric interactions and elastic stress dependent growth characteristics. Nutrient is able to diffuse within and between the colonies. The mechanism of microbial colony growth involves reproduction of cells within the colonies and the merging of different colonies. We report results on the dynamic scaling laws and final state size distribution, that capture in semi-quantitative detail the trends observed in experiment.

[1]Supported by NSF Grant 0822613

Minhui Zhu
Univ of Illinois - Urbana

Date submitted: 12 Nov 2016 Electronic form version 1.4